

CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1 1. A method for reducing motion artifacts and
2 patient dose in radiological imaging using four
3 dimensional computed tomography (4D CT), comprising
4 the steps of:
5 identifying artifacts in 4D CT images of an
6 anatomy being imaged, said image artifacts being
7 responsive to irregularities in a periodic motion
8 of said anatomy;
9 measuring said periodic motion of said anatomy
10 so as to detect said irregularities;
11 controlling a 4D CT scan of said anatomy so as
12 to pause the scan during periods having said
13 detected irregularities.

- 1 2. A method as in claim 1, wherein said anatomy is
2 a lung and said measuring step uses a respiratory
3 signal.

- 1 3. A method as in claim 2, wherein said measuring
2 step further comprises the steps of:
3 recording said respiratory signal over a
4 plurality of breathing cycles; and
5 constructing an envelope of spatial and
6 temporal tolerances, wherein regular ones of said
7 plurality of breathing cycles are within said
8 envelop and irregular ones of said plurality of
9 breathing cycles extend beyond said envelope.

1 4. The method of claim 3, wherein said controlling
2 step further includes the steps of:
3 acquiring a respiratory signal during said 4D
4 CT scan;
5 applying said envelope to said respiratory
6 signal; and
7 adapting said 4D CT scan to said respiratory
8 signal by excluding from said 4D CT scan data
9 acquired when said respiratory signal is not within
10 said envelope.

1 5. The method of claim 4, wherein data acquired
2 during irregular respiratory cycles is excluded by
3 pausing said 4D CT scan data acquisition when said
4 respiratory signal is not within said envelope.

1 6. A system for reducing motion artifacts and
2 patient dose in radiological imaging using four
3 dimensional computed tomography (4D CT),
4 comprising:
5 means for identifying artifacts in 4D CT
6 images of an anatomy being imaged, said image
7 artifacts being responsive to irregularities in a
8 periodic motion of said anatomy;
9 means for measuring said periodic motion of
10 said anatomy so as to detect said irregularities;
11 means for controlling a 4D CT scan of said
12 anatomy so as to pause the scan during periods
13 having said detected irregularities.

1 7. A system as in claim 6, wherein said anatomy is
2 a lung and said measuring means uses a respiratory
3 signal.

1 8. A system as in claim 7, wherein said measuring
2 means further comprises:

3 means for recording said respiratory signal
4 over a plurality of breathing cycles; and

5 means for constructing an envelope of spatial
6 and temporal tolerances, wherein regular ones of
7 said plurality of breathing cycles are within said
8 envelop and irregular ones of said plurality of
9 breathing cycles extend beyond said envelope.

1 9. The system of claim 8, wherein said controlling
2 step further comprises:

3 means for acquiring a respiratory signal
4 during said 4D CT scan;

5 means for applying said envelope to said
6 respiratory signal; and

7 means for adapting said 4D CT scan to said
8 respiratory signal by excluding from said 4D CT
9 scan data acquired when said respiratory signal is
10 not within said envelope.

1 10. The system of claim 9, wherein data acquired
2 during irregular respiratory cycles is excluded by
3 pausing said 4D CT scan data acquisition when said
4 respiratory signal is not within said envelope.

1 11. A method for reducing motion artifacts in
2 radiological imaging using four dimensional
3 computed tomography (4D CT), comprising the steps
4 of:

5 identifying artifacts in 4D CT images of an
6 anatomy being imaged, said image artifacts being

7 responsive to irregularities in a periodic motion
8 of said anatomy;
9 measuring said periodic motion of said anatomy
10 so as to detect said irregularities;
11 controlling post-processing of a 4D CT scan of
12 said anatomy so as to omit data acquired during
13 periods having said detected irregularities.

1 12. A method as in claim 11, wherein said anatomy
2 is a lung and said measuring step uses a
3 respiratory signal.

1 13. A method as in claim 12, wherein said
2 measuring step further comprises the steps of:
3 recording said respiratory signal over a
4 plurality of breathing cycles; and
5 constructing an envelope of spatial and
6 temporal tolerances, wherein regular ones of said
7 plurality of breathing cycles are within said
8 envelop and irregular ones of said plurality of
9 breathing cycles extend beyond said envelope.

1 14. The method of claim 13, wherein said
2 controlling step further includes the steps of:
3 acquiring a respiratory signal during said 4D
4 CT scan;
5 applying said envelope to said respiratory
6 signal; and
7 adapting said 4D CT scan to said respiratory
8 signal by excluding during said post-processing of
9 said 4D CT scan data acquired when said respiratory
10 signal is not within said envelope.

1 15. The method of claim 14, wherein data acquired
2 during irregular respiratory cycles is excluded by
3 omitting data acquired during said 4D CT scan when
4 said respiratory signal was not within said
5 envelope.